Surface Roughness and Microhardness of Two Recent CAD/CAM-Materials After Storage

Simon Flury, Elisabeth Diebold, Anne Peutzfeldt, Adrian Lussi

Department of Preventive, Restorative and Pediatric Dentistry, School of Dental Medicine, University of Bern, Switzerland

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Objectives

To investigate surface roughness and microhardness of two recent resin-ceramic materials for computer-aided design/computer-aided manufacturing (CAD/CAM) after polishing with three polishing systems. Surface roughness and microhardness were measured immediately after polishing and after six months storage including monthly artificial toothbrushing.

Methods

Sixty specimens of Lava Ultimate (3M ESPE) and 60 specimens of VITA ENAMIC (VITA Zahnfabrik) were roughened in a standardized manner and polished with one of three polishing systems (n = 20/group): Sof-Lex XT discs (SOFLEX; three-step (medium-superfine); 3M ESPE), VITA Polishing Set Clinical (VITA; two-step; VITA Zahnfabrik), or KENDA Unicus (KENDA; one-step; KENDA Dental). Surface roughness (Ra; µm) was measured with a profilometer and microhardness (Vickers; VHN) with a surface hardness indentation device. Ra and VHN were measured immediately after polishing and after six months storage (tap water, 37°C) including monthly artificial toothbrushing (500 cycles/month, toothpaste RDA ~70). Ra- and VHN-values were analysed with non-parametric ANOVA followed by Wilcoxon rank sum tests ($\alpha = 0.05$).

Results

For Lava Ultimate, Ra (mean [standard deviation] before/after storage) remained the same when polished with SOFLEX (0.18 [0.09]/0.19 [0.10]; p = 0.18), increased significantly with VITA (1.10 [0.44]/1.27 [0.39]; p = 0.0001), and decreased significantly with KENDA (0.35 [0.07]/0.33 [0.08]; p = 0.03). VHN (mean [standard deviation] before/after storage) decreased significantly regardless of polishing system (SOFLEX: 134.1 [5.6]/116.4 [3.6], VITA: 138.2 [10.5]/115.4 [5.9], KENDA: 135.1 [6.2]/116.7 [6.3]; all p < 0.0001). For VITA ENAMIC, Ra (mean [standard deviation] before/after storage) increased significantly when polished with SOFLEX (0.37 [0.18]/0.41 [0.14]; p = 0.01) and remained the same with VITA (1.32 [0.37]/1.31 [0.40]; p = 0.58) and with KENDA (0.81 [0.35]/0.78 [0.32]; p = 0.21). VHN (mean [standard deviation] before/after storage) remained the same regardless of polishing system (SOFLEX: 284.9 [24.6]/282.4 [31.8], VITA: 284.6 [28.5]/276.4 [25.8], KENDA: 292.6 [26.9]/282.9 [24.3]; p = 0.42–1.00).

Conclusion

Surface roughness and microhardness of Lava Ultimate was more affected by storage and artificial toothbrushing than was VITA ENAMIC.

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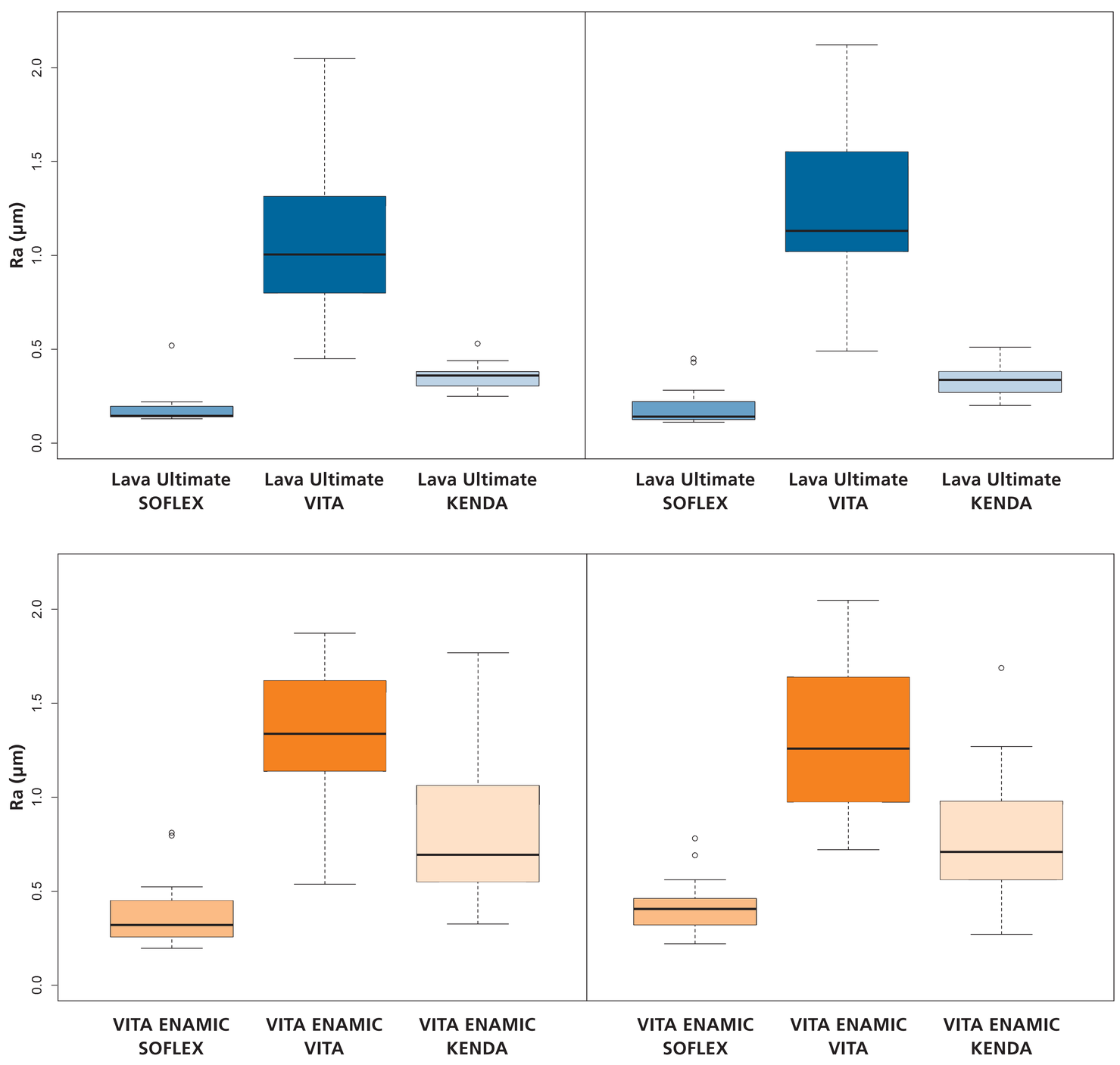
Surface Roughness



Microhardness